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FINAL REPORT

Mars Geologic Mapping--MTM 15057, MTM 20057, MTM 20052

NAGW-1225

NASA Planetary Geology and Geophysics
Mars Geologic Mapping Program

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INTRODUCTION

Maja Valles begins as an outflow from the breached Juventae Chasma and associated chaotic terrain. The outflow was channeled between the east sloping surface of Lunae Planum and the Xanthe Terra highlands. The semiconfined flow can be traced along the eastern edge of Lunae Planum over 1000 km northward. It turns eastward, descends across Xanthe Terra, and continues northeast into Chryse Planitia.

Maja Valles crosses Xanthe Terra through a well-developed canyon. North of the canyon, an interconnected, complex system of anastomosing valleys are cut in cratered terrain of Xanthe Terra. These trans-Xanthe channels carried water from the Lunae Planum surface to the lower Chryse Planitia surface.

Scour, channeling and streamlined islands mark the path of the outflow on Lunae Planum and across Chryse Planitia. Breached craters and eroded ridges attest to impoundment and subsequent overflow along the drainage route. Deltas or alluvial fans at the mouths of the channels are sites of deposition as the valleys exit the highland terrain.

OBJECTIVES

This study was undertaken to map, at 1:500,000, the geology of three quadrangles in the region in which Maja Valles turns eastward to cross the Xanthe Terra highlands and disgorges onto Chryse Planitia. The three map sequence includes MTM 15057, MTM 20057, and MTM 20052. MTM 15057 covers the northern part of Maja

Valles on Lunae Planum and the head of the canyon part of Maja Valles on Xanthe Terra. MTM 20057 includes a region of ponding on Xanthe Terra and the heads of Barham, Vedra, and Maumee Valles. MTM 20052 includes the western edge of Chryse Planitia and the mouths of Maja Valles canyon and the trans-Xanthe valleys as well as the record of the combined flow from these chamels across Chyrse Planitia.

The objectives of this study were to map the geology and to determine the sequence of events at this pivotal part of Maja Valles. Special emphasis was directed toward understanding the anastomosing valleys that cross Xanthe Terra north of the canyon section of Maja Valles. It is important to determine whether these valleys represent a separate event or whether they are part of the Maja outflow event. The study was also directed toward identification of sedimentary deposits along the Maja Valles course.

The proposed work consisted of one map to be completed by the PI and two maps to be completed by graduate students, Jim Rice and Steve Archibald, at Northeast Louisiana University. The maps prepared by students were to be used as part of their MS thesis, and the final map produced publication as an U.S. Geological Survey Misc. Investigation were to be placed in final form and shepherded through the review process by the PI.

WORK COMPLETED

The geologic map of MTM 20057, the Pompeii Quadrangle, is

complete and in press (De Hon, 1991). Several expanded abstracts and presentations have been presented at national meetings. One paper, an analysis of flow through the channel complex across Xanthe Terra, has been submitted to the Proceedings of the Lunar and Planetary Science Conference.

The student maps are incomplete. One student researcher has started work on his PhD at Arizona State University, and the other has left school to take full time employment. Neither student has completed their thesis, but both students expect to finish their mapping in the near future. The PI has received a first version the thesis by Jim Rice (now at Arizona State University). We plan to begin review of the U.S. Geological Survey version of this map (MTM 20052) during the summer. Steve Archibald plans to submit his thesis during the summer (1991). The map (MTM 15057) will be ready for review at some later date.

PUBLICATIONS:

De Hon R.A., 1991, Geologic Map of the Pompeii Quadrangle [MTM 20057], Maja Valles Region of Mars: U.S. Geological Survey, Misc. Inves. Map I-2203.

_____, 1990, Hydraulic routing of the Maja outflow across Xanthe Terra: Lunar Planet. Sci. XXI, 266-267.

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_____, 1987, Eastern Lunae Planum Outflow Complex: analogy to overbank flooding: Lunar Planet. Sci. Conf. XVIII, 227-228.

De Hon, R.A. and E.A. Pani, 1991, Flood surge though the Lunae Planum Outflow Complex: Proc. 22nd Lunar Planet. Sci. Conf. (in press).

Rice J.W. 1989, The Geology of the Maja Valles Region, Mars (MTM 20052): Lunar Planet. Sci. Conf. XX, 898-899.

Rice J.W., S.M. Archibald, R.A De Hon, 1988, Lower Maja Valles: Lunar Planet. Sci. Conf. XIX, 976-977.